SCIENCE PITS AIR AGAINST SEA IN FIGHT FOR MILLIONS

Spectacular Effort Being Made Off Delaware Capes to Raise Freighter Washingtonian, Sunk on Her Maiden Voyage

Novel Application of Pneumatic Salvage Methods Bids Fair to Net Wreckers Handsome Sum Despite Big Handicap

DAVY JONES'S locker has to give up some of its hoarded plenty. At least such is the dictum of the marine wrecker, for to-day more than ever the spoils of the deep are at a premium.

Salvors of the sea are toiling overtime now, but their quest is not so much for riches of gold and silver as it is vessels. Sunken ships, apart from any precious cargo, are worth a king's ransom at present if for no more ambitious service than that of hauling the glut of freight awaiting oversea carriage.

Curiously the most spectacular of these undertakings is not concerned with the refloating of a victim of the present conflict. Instead it is now engaged upon the preliminaries looking to the raising of an American freighter which foundered off the Delaware coast about eighteen months ago. The task is entirely unlike any previous ocean salvage problem, and if the men who have had the courage to essay it succeed they will place this country just so much further in the forefront of daring engineering ventures. While the ship was lost through a sea accident in time of peace, still the world war is unquestionably accountable for the present effort to recover her from the ocean's bottom. The vessel is the American-Hawaiian liner Washingtonian.

Eighteen months ago the Washingtonian was valued at $750,000, based on what she cost when built in 1914. As ships go the Washingtonian was not a big craft, having a gross tonnage of only 6,650, and yet to-day, could she be restored to service, she would be easily worth $2,000,000! Is there any wonder, then, that she has proved a compelling lure to marine wreckers despite the fact that under normal conditions she would probably be considered an irrevocable loss? The public generally does not realize the state of affairs in the shipping world.

There is plenty of romance to-day in seafaring life despite all that aged croakers and retired seadogs may say. True, not since the days of the clipper ship has it been possible until now to make a craft pay for herself in a single voyage, and that is why marine junk heaps and nautical cemeteries generally are being raked over to breathe new life into substantially abandoned hulks and set them out again upon profitable ventures. Craft that could be bought for $50,000 four years ago—sorry relics of former periods of usefulness—have brought of late substantially $250,000 to their lucky owners. This demand for means of water carriage has become well nigh insatiable, and it was not long ago that four old schooners, scarcely better than junk, netted the tidy sum of more than $100,000. Innumerable instances of this tremendous increase in the value of shipping might be cited, but those mentioned should suffice to make it plain why it is well worth while to make a valiant effort to refloat a ship not a year old when carried to the bottom eighteen months back.

On January 26, 1915, on the second run of her career, the Washingtonian was nosing her way comfortably northward bound for Philadelphia. She was heavily loaded with raw sugar from the plantations of Hawaii, and all had gone well with her until she drew up abreast of the Delaware coast. Then a heavy fog shut in and compelled her to slow down and to feel her way cautiously toward the capes of the Delaware. As the freighter crept closer to the lightship on Fenwick Island shoal out of the gloom a great five masted schooner loomed upon the Washingtonian's quarter and bore down upon her nearly in line with the steamer's mainmast. There was no chance for a saving manœuvre. The schooner crashed full upon the freighter and heeled her over at a sharp angle, crushing the Washingtonian's side and tearing her upper or shelter deck aft and sending her mainmast overboard.

The captain of the Washingtonian was on the bridge, and to him the blow seemed rather an easy, glancing one, although his ship rolled deeply under the impact. He saw his mainmast fall, and his first thought was how funny his ship would look steaming up the Delaware with only her foremast standing. Slowly the Washingtonian righted, and well nigh before this sluggish movement had carried her beyond the perpendicular and to the opposite side she began to roll back again, with a steadily increasing angle toward her labored roll. Instead of recovering again, however, her heel increased, and in a few moments her remaining mast and smokestack were level with the water and a brief while afterward, having paused as if uncertain, the freighter turned her bridge, capsized fully and went to the bottom in approximately fourteen fathoms of water. She sank at a point about fifteen miles off shore and to the south and east of Cape Henlopen. From the time she was struck by the five masted schooner Elizabeth Palmer until she disappeared was an interval of only ten minutes.

We might just as well go a bit more into the details of her foundering, because the circumstances of her sinking have a direct bearing on the problem of her salvage. The Washingtonian was so deeply laden that her freeboard or height above water did not exceed nine feet, and, in the language of the sea, she was so nearly unstable that she verged upon what is called "cranky" among sailormen. The Elizabeth Palmer, on the other hand, was running light, and by the very nature of her overhanging bow and forefoot the schooner was carried up on the steamer, crushed the freighter's deck and bore her down by sheer weight. As a result of the excessive heel thus produced water rushed into the hold of the Washingtonian and at a point well above her centre of gravity. Now see what followed.

The sea was greedily absorbed by the upper mass of the sugar cargo and was not allowed to work its way downward. As a result, hundreds of tons of dead weight were in this way suddenly applied at a comparatively high point. Owing to her already sensitive condition because of her deep lading, her centre of gravity was quickly shifted still higher, the ship was overbalanced, and within a short time, as told, she rolled over, filled and sank to the sandy floor of the Atlantic. Only one man was lost. He was deceived by the vessel's sluggish motions immediately following the collision and went into his quarters to get something. Before he was able to return to the deck the boat heeled over and plunged below the surface. Instead of settling upright when reaching the bottom the Washingtonian assumed a final pose that left her resting over on one side at an angle of something more than 14 degrees. Strange as it may seem, this posture, which would ordinarily add to the difficulty of salvage operations, in this case is the very thing upon which the wreckers count to help them most in lifting the freighter from the ocean floor and facilitating her carriage into the sheltered shallower waters inside of the Delaware Capes.

For some time after her sinking the exact position of the Washingtonian was not known. Nearly a month later a stream of black oil was discovered on the water near the lightship. As the Washingtonian was an oil burner soundings were made by the Government at that point and it was not long before the wreck was accurately located. A buoy was planted as a warning to navigators, but beyond that it then promised to be of no service, because among the wrecking fraternity generally it was thought that any efforts to refloat the vessel would be a certain loss of time and money. No ship similarly sunk in the open sea ninety feet down had ever been salved, and past performances commonly guide these gentry in their undertakings. The run of these salvors are a hidebound lot, and it is only when a man of engineering cunning and initiative comes along that a step forward is recorded in the art.

In this case, however, a sea captain and not an engineer inspired the present unparalleled venture. Youthful zeal has insisted upon a hearing. The persuasiveness of youth has won to its aid the necessary capital and experts, young in years but wise through experience, have joined hands in attacking the seemingly prohibitive. The story is well worth the telling.

One man never despaired of recovering the Washingtonian. He is Capt. Lester A. Blake, until recently in command of the Ohioan, a sister ship of the unfortunate craft and one of the busy fleet of the American-Hawaiian Line. While tramping the bridge during long runs at sea and while pondering in the privacy of his cabin Capt. Blake became more and more convinced that the Washingtonian could be saved. He had read with keen interest and satisfaction of some of the salvage wonders wrought with compressed air by W. W. Wotherspoon of New York city, and the more he thought of it the stronger grew his belief that air properly applied would prove the medium of the sunken freighter's salvation. Capt. Blake set about in a practical fashion to prepare for the task that gripped his imagination.

First he studied his own ship intimately and with a thoroughness that had never engaged him before. He pictured to himself just how the Washingtonian lay upon the bottom and marked off by examination of the Ohioan what structural features could be counted upon to form air pockets to insure sufficient buoyancy to bring the sister craft to the surface. Next, in his spare time, he set about having duplicate fittings made of those aboard his ship and which would have to be used as attachments to similar pipe lines or vents in the decks or hatches of the Washingtonian.

With this work done he reached Philadelphia near the end of last April, and as soon as he could leave his command he came on to New York to lay his project before his employers, the officials of the line. His principals had never legally abandoned their claim to the wreck, and Capt. Blake hoped to interest them in the undertaking he had in mind. His visit was upon a Saturday, a short day, and his superiors could give him little time. They said they might be interested if he could find people to take a gamble upon so manifest a venture. At the same time they informed him that he was to proceed to Boston and to assume command of another one of the line scheduled to leave early the week following. This left Capt. Blake a wofully short time in which to recruit assistance and to detail his scheme to sympathetic ears. He had to return to Philadelphia at once to the Ohioan.

But Capt. Blake is nothing if not resourceful. He bethought himself of a kindred spirit, a naval architect of New York city, Theodore D. Wells. He wired his friend to meet him Sunday morning in Philadelphia. Mr. Wells is youthful and likewise enthusiastic. During the conference that Sabbath morning in the City of Brotherly Love the sea captain and the designer of ships threshed out the problem from every point of view and, as a result, Mr. Wells took upon himself the task of securing the necessary financial backing and the working out of certain technical details properly coming within the special purview of his profession. Mr. Wells's task was not an easy one, even though himself convinced of the possibility of recovering the freighter. It was necessary to find a man of wealth with a knowledge of the sea and sportsman enough to play a long shot. In short, a big man and one who would see the venture through with ready open-mindedness and generosity. The naval architect, after long weeks of effort, found the sponsor he needed, but that did not entirely clear the way.

Just about a month ago Mr. Wells wired Capt. Blake, then returning to the Atlantic after a long run back from the Pacific via the Straits of Magellan, that he was ready for action. It was up to the American-Hawaiian Line skipper then to get a furlough from his company. In the months that had passed they had forgotten about Capt. Blake's scheme to raise the Washingtonian, and were much surprised when he asked for leave. However, they readily granted his request and went still further: they formally relinquished all claim to the sunken freighter and surrendered their claim to her to the United States Government.

The authorities of the War Department then bestirred themselves because the wreck was a menace to navigation. It had been necessary for them to shift the lightship on Fenwick Island Shoals in order to give an additional warning to navigators bound up and down the coast. The army engineers next advertised for bids covering the removal of the submerged menace. One salvage company proposed to pay the Government $1 and to undertake the work at a gamble. The successful bidder volunteered to do the same thing, but to buy the rights for $101. For this consideration, the award went to Mr. Wells and his associates, but the unsuccessful bidder, the Yankee Salvage Company of New York city, was asked to cooperate because of its valuable facilities and the rare experience of its ranking expert, William Wallace Wotherspoon, the latter making the third of the youthful spirits engaged.

A few days ago the wrecking fleet sailed away from this port and at present is over the site of the sunken freighter making the careful and necessarily somewhat slow preparations preliminary to getting the Washingtonian away from her submerged resting place. The weather is going to play a prominent part in the whole procedure because the exposed position in the open sea, about fifteen miles off shore, means that the task can be pushed along only when the winds are light and the waves moderate.

More than that, the salvors cannot make two bites of this great engineering cherry. Once the ship is floated clear of the ocean floor and brought to the surface she must be towed into the haven at the Delaware Capes and grounded upon soft bottom in sheltered waters. Further, the wreckers have to keep her heeled over much as she lies to-day, for should she right herself she will sink at once and be beyond recovery. In other words if she rested upright upon the seabed in ninety feet of water in the open Atlantic even the most daring salvor would not give a moment's thought to the idea of her refloating.

The layman reasonably asks why this is so, because to him a vessel resting upright would seem to be an easier problem to deal with than one leaning far over on her wounded side. This is because he does not know all of the difficulties involved in raising a ship by compressed air, which is the medium to be employed in this case. Plainly the air must be blown into the craft so as to expel water and thus to form buoyant pockets. Now it just so happens that ships are not built to withstand even a moderate bursting pressure exerted within and confined between decks, nor are the covers to hatches sturdy enough to withstand such an upward or outward thrust.

Sunken craft of course have been raised by means of compressed air applied between decks, but these vessels were submerged in sheltered and comparatively shallow waters. There divers could get inside of the craft and reenforce or brace the decks with timbers and thoroughly seal the hatches and other vents. Lying as she does in the full sweep of the Atlantic nearly a hundred feet down, this procedure is out of the question in the case of the Washingtonian. The wreckers have to make the most of her existing structural strength and to place the buoyant air where her steel work and the chance advantage of her posture make it feasible to give her buoyancy without risk of rupturing decks and having all of their labors count for naught.

It just so happens that the three between deck spaces have only a few openings of any considerable size—there are the cargo hatches. There are a number of vents of small calibre in the decks and these pipes have threaded caps. By great good luck these connections are placed well off to the sides near the rail and are just where air can be admitted to best advantage into the water filled ship. Again, connections leading from the upper or shelter deck down to the double bottom space make it feasible to apply air at the lowest point in the Washingtonian's body. Now let us see why her big angular heel is going to help the wreckers.

Take a broad shouldered, flat bottle of small neck and nearly fill it with water. Then put a finger over the opening, tilt the bottle on one of its narrower sides to simulate the angle of the Washingtonian, and watch how the air crowds itself into the triangular space in the upper shoulder. Put the bottle in a bucket, still keeping it in the same position, and even though the finger be removed from the opening the air will remain confined above the upper line of the neck. The neck in this case represents the hatch combings in the shelter deck. Triangular pockets of the same sort exist within the Washingtonian between her decks and upturned side and make it possible to crowd into these spaces, without fear of rending the ship's structure, enough air to nearly raise her from the sea bed. This would not be possible if the freighter were upright, because the air would either lift off the decks or blow its way free by way of the hatches. The man in the street must now realize why it is necessary to keep the ship heeled over.

But Mr. Wells has planned to improve in degree upon Capt. Blake's scheme. He is going to make compressed air tilt the Washingtonian still more toward her wounded side so as to be able to increase the size of the air pockets between decks. Here is where the connections with the double bottom are to figure. Of course it must be understood that all of the deck vents are joined with hose leading up to the salvage vessels. On these boats a special equipment of air compressors has been installed, so that there will always be available an abundant reserve of the buoyant element. But the details of this equipment do not concern us now.

By forcing air into the double bottom, which is virtually a very strong and tight compartment or tank, the air will rise to the highest point as it displaces the water, and at the proper moment will tend to lift the bottom and to incline the ship more and more until her deck stands nearly up and down. In this fashion more than a third of the Washingtonian's interdeck space can be turned into a great buoyant chamber. This will be ample to break the craft away from the grip of the sea bed and to bring her to the surface like a gigantic submarine in the "awash" condition.

This may all sound rather simple, but juggling with a sluggish ship partly filled with air and with most of her body below water even when at the surface is not without its serious difficulties. Any movement or rolling on the part of the vessel might easily tend to let the air out in great gulps and in quantities larger than the storage tanks on the salvage craft would be able to replace quickly or frequently. Therefore the freighter has got to be kept over on her side, and the buoyancy in her double bottom, tending to tilt her more, must be counterbalanced or equalized by another and external righting medium. Here again the naval architect's cunning has anticipated developments.

Mr. Wells uses the remaining mast of the Washingtonian as a lever to check the buoyancy in the double bottom and to keep the craft over on her side when the surface is reached. To this end he has planted a great buoy or tank, capable of control, which can exert a buoyant moment, when entirely empty, of some scores of tons. This tank will be attached by an adjustable line near the top of the mast, and by holding that spar up will exert a counter effort against the buoyancy in the double bottom seeking to lift the ship's keel uppermost. Between these two contending forces the freighter will be held in the desired position while being towed within the sheltering Delaware Capes. It must be remembered, of course, that the length of the connecting line will be such as to permit the mast to be nearly horizontal when the control tank is floating.

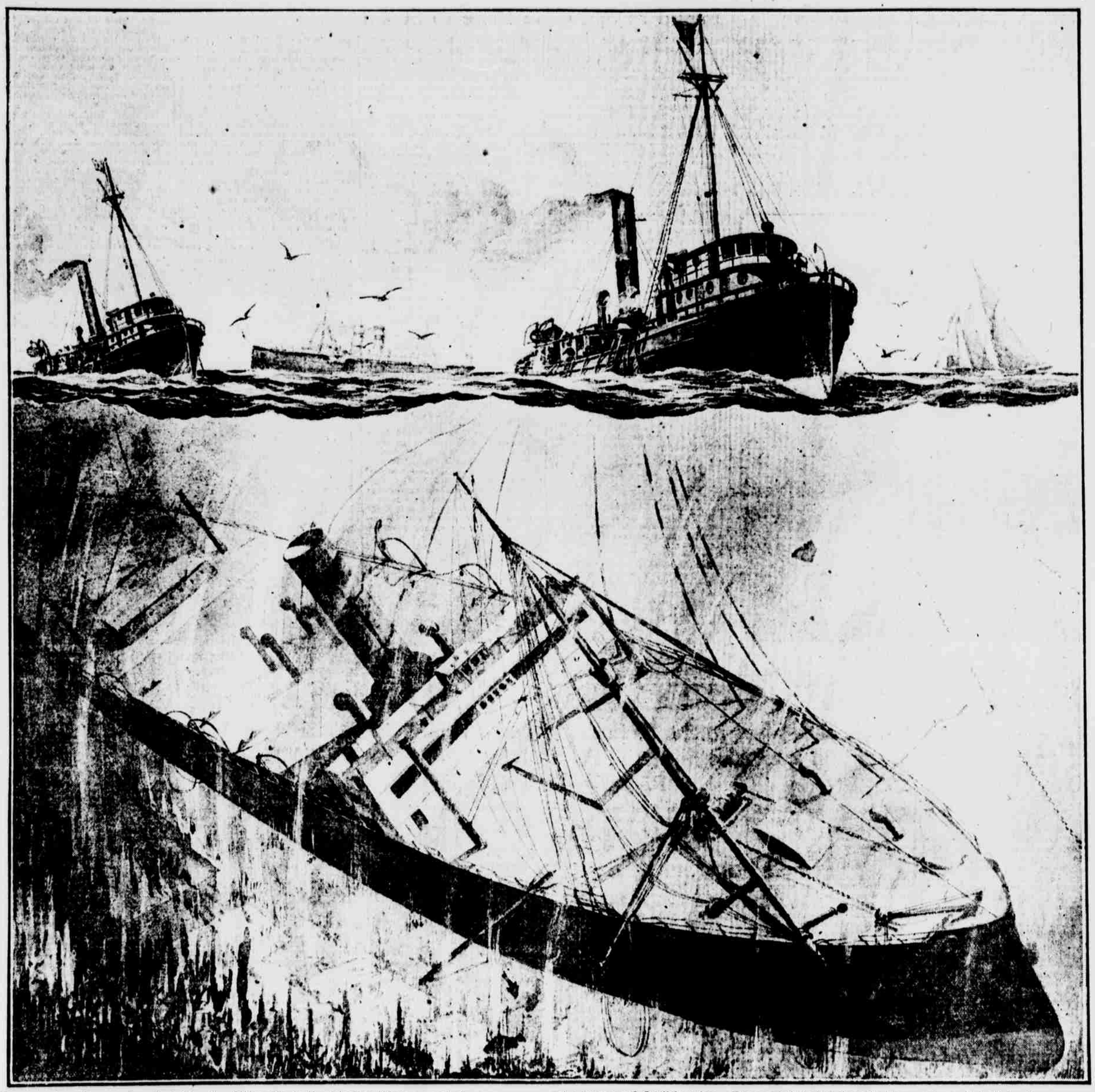
To supply all of the air needed the two salvage steamers carry powerful compressors. Some of these are driven by steam and some of them by gasolene motors. The air is then stored in large tanks under great pressure and sufficient can thus be held in reserve to fill all of the pockets in the sunken ship and to have a steady surplus to meet a sudden demand. In addition to these compressors there are other smaller independent ones which will store in a similar fashion the air that will be required to take care of the corps of divers when under water. Upon these men will fall the onerous task of uncovering the various deck vents and then securing to them the hose by which air will be forced inside of the water filled wreck. The sharp slope of the ship's deck will make this work decidedly risky, for undoubtedly sea growths have gathered upon her, and ocean ooze besides will make a foothold there slippery and uncertain.

Should the salvors succeed in raising the Washingtonian and towing her into the mouth of the Delaware, then their efforts will be centred in shifting her into an upright position and completely floating her. To this end after reaching shoal water all vents, hatch openings and her wound will be closed. With this done powerful pumps will be set at work and the vessel drained so that she will rise and rest upon the water much as she did when running light. To steady her when she has been sufficiently drained water will be admitted into her double bottom and thus, serving as ballast, will hold her upright.

This part of the salvage undertaking is of the commonplace sort and comparatively easy. Once restored to normal floating condition it is the intention of the wreckers to bring her to New York and here to make her fit again for an active and promising career. She will be well worth the time and money spent if success crown the efforts of the salvors, and the shipping world awaits expectantly the outcome of this extremely novel and courageous undertaking.

An interesting and possibly tragic turn to the salvage of the Washingtonian developed after the foregoing was written. As told in the news columns of THE SUN last Sunday, divers discovered a new wound in the upper side of the sugar freighter. As this side of the vessel is fully thirty-five feet below the surface, it is believed only a submarine could have done the damage. The Washingtonian lies directly in the theoretical courses of the Deutschland and Bremen, Germany's undersea freight craft.

The Washingtonian's new wound, experts believe, will not interfere with the salvage operations.



Resurrection of a sunken freighter by filling the hull with new life by great air compressors and a system of flexible tubes. The work is being done in deep water and right in the open sea.